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Skin Disease Detection Using Novel Image Processing Techniques

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Skin diseases are among the most prevalent health issues affecting individuals of all ages, causing both physical discomfort and psychological stress. Early and accurate detection is crucial for effective treatment, yet diagnosis often relies heavily on the experience of medical specialists. This study proposes a novel skin disease detection system using advanced image processing techniques to improve diagnostic accuracy while remaining cost effective and accessible. The system captured digital images of affected skin areas and applied a series of preprocessing steps, including resizing, grayscale conversion, contrast enhancement via MinMax linear stretching, noise reduction using a Wiener filter, and hair removal through mathematical morphology. Segmentation was performed using a threshold-based method, and features were extracted using the grey level cooccurrence matrix. For classification, multiple machine learning models were evaluated: LightGBM (48% accuracy), Support Vector Machine (93.8% accuracy), Naïve Bayes (49% accuracy), Decision tree (55% accuracy), and Random Forest (94% accuracy). A combined ensemble approach further improved detection, achieving an overall accuracy of 98% across three skin disease categories. In addition, F1-scores and balanced accuracy metrics were computed to account for class imbalance in the dataset, providing a more robust evaluation. While the system demonstrates promising results and potential for scalable, cost-effective skin disease screening, limitations include dataset size and diversity, which may affect generalizability. Future work will focus on expanding the dataset, refining segmentation and feature extraction methods, and validating the system in clinical settings.

Keywords: Skin disease detection, Image processing, Feature extraction, Segmentation, Classification, Machine learning.